

CASE HISTORY

A Cure for Environmental Emissions

Disposing of nearly 1 million pounds of medical waste a month is no easy task. The wet electrostatic precipitator, installed at Rochester, MN-based Mayo Clinic, seems to be just what the doctor ordered.

While the medical waste incinerator at Mayo Clinic in Rochester, MN, consistently met state and federal emission requirements, facility leadership recognized that installing a wet electrostatic precipitator (WESP) on the pollution control equipment would enable the facility to increase its particulate removal to 99.9 percent and allow the operation to contribute to a cleaner environment.

Mayo Clinic's medical waste incinerator serves Mayo, Saint Mary's Hospital, and Rochester Methodist Hospital. Together, the facilities form the largest group medical practice in the world and process 2,000 pounds of waste an hour, 24 hours a day, five days a week. The incinerator is responsible for the safe, environmentally compliant, thermal destruction of all medical waste generated at the 14-million-square-foot medical, clinical, research, and educational campus.

A new wet air scrubber was installed on the incinerator in 2004, replacing a dry scrubber and fabric filter collector. The scrubber performed exceptionally well at removing acid gases, and the level of particulate emissions met both state and federal require-

ments. However, Mayo Clinic challenged itself to reduce those emissions even further.

An environmental responsibility

Karl Corrigan, Mayo's section head, division of outpatient project services, department of facilities & support services, explains: "Mayo Clinic's commitment to environmental responsibility, combined with our goal of meeting or exceeding regulatory standards—as well as positioning Mayo to meet potential, increasingly stringent future requirements—led us to explore ways in which we could voluntarily reduce our particulate emissions."

As Mayo evaluated different technologies that could be added to its existing air pollution control equipment system to achieve the desired objective, a WESP was determined to be the optimal solution. WESP technology is highly efficient for removing particulate matter. With a wet gas stream exiting from the scrubber, a baghouse or fabric filter removal system would not be effective because the bag or fabric would blind up as a result of the water vapor. However, given today's new environmental rules

and regulations, for a scrubber to continue meeting emission limits without an auxiliary piece of equipment would have been difficult.

Two key needs were addressed by the WESP installation. Mayo's required performance param-

eters included an extremely low particulate limit of .0048 grains per cubic foot, which was lower than the EPA's proposed regulations at the time. In addition, since Mayo wanted to install equipment in an existing facility to minimize costs, the unit would have to be customized to meet height restric-

tions, yet still provide the same square footage of collection surface as a taller unit.

In 2009, after a comprehensive search process, Mayo Clinic chose a WESP system with a high-energy ionizer and discharge electrode technology that could be sized to specific applications

Upon approval of the final design, the mechanical, electrical, and utility changes needed to accommodate the new equipment were determined. Next, Mayo's facility engineers coordinated a window of time for installation because a one-week system shutdown was necessary.

Today, the installed WESP runs at very high efficiency for particulate removal and has met Mayo's specifications.

"From our standpoint, we had a warranty level that needed to be met," Corrigan says. "The stack testing that has been done shows the unit easily meets its warranty level, which was significantly below the required emission limit level."

Added benefits

The existing pollution control equipment on Mayo Clinic's medical waste thermal oxidizer is a wet venturi scrubber to remove the particulate matter. The higher the pressure drop across the venturi, the greater the particulate removal, but it is less efficient on the sub-micron-sized particles. The venturi had run at about 55 inches of pressure drop. Testing shows that once the facility's permit is amended, the venturi will be able to run at about 30-35 inches of pressure drop with the addition of the WESP and still easily meet the new guidelines.



A wet electrostatic precipitator installed at the Mayo Clinic has helped the facility reduce particulate emissions created by incinerating millions of pounds of medical waste. The technology is helping Mayo comply with regulations and meet what the operation considers its environmental responsibility.

“As that pressure drop increases, there’s a lot less energy for the fan to pull,” notes Corrigan. “That will enable us to save power since we will not have to run that large fan at such a high pressure drop. In addition, when the fan runs hard, it creates a lot of noise. Running at a lower pressure drop reduces the noise level dramatically, which improves the environment for employees working in the facility.”

An analysis of the particulate indicated that the unit was capturing primarily copper and zinc. As a result, Mayo was able to send the wash-down water into Mayo’s wastewater pretreatment system for corrective action in-

stead of directly to the sanitary sewer.

Mayo Clinic is committed to environmental responsibility in a cost-effective, efficient manner. **APC**

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